Partial Listing

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(54) **SIMULTANEOUS MANUFACTURING AND PRODUCT ENGINEERING INTEGRATED WITH KNOWLEDGE NETWORKING**

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(57) **ABSTRACT**

Method of simultaneously carrying out manufacturing and product engineering integrated with knowledge networking. The method comprises: (a) creating a logic modeller by (i) identifying elements of an engineering project and syntactically arranging such elements in a logic sequence based on engineering functions, (ii) ascertaining uniform meaning for such elements and engineering functions to allow for interdisciplinary communication, (iii) gathering existing knowledge pertinent to such elements and engineering functions, and encoding such gathered knowledge into terms according to uniform meanings, and (iv) programming a computer memory template with such logic sequence and with attached data bases of such encoded existing knowledge; and (b) operating said logic modeller through a direct engineer that: (i) requests review of initial input specifications of an inchoate design that results in an analysis by the modeller to indicate rule or constraint violations of the gathered knowledge, and (ii) interacts with the analysis in response to such indications to converge on acceptable or improved engineering design functions.

15 Claims, 9 Drawing Sheets
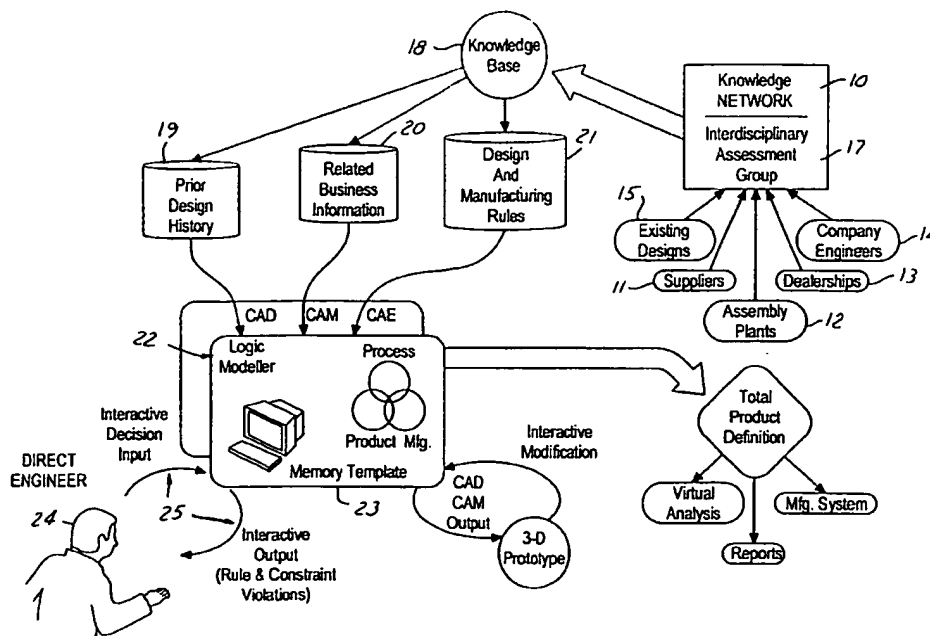
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Operating the logic modeller may start with selection of a points file in
CAD and transporting such file into the modeller. Analysis by the modeller
will present alternatives or suggested ways to overcome violations. If the
first stages of interaction with the logic modeller does not result in a
desired total product and manufacturing definition, the definition may be
converted to a **3-D** object for visual analysis so that the interactive step may
be reiterated.

Before the final total product definition is reached, the direct engineer
has the flexibility to interact with the developing inchoate design using a
3-dimensional prototype device that produces a physical specimen based on the
modeller **design file**. In this way, the direct engineer can survey and further
analyze the physical full sized product to see how it may function with
associated elements or assemblies, and thus make other changes by modifying
the
design file (see FIG. 1).